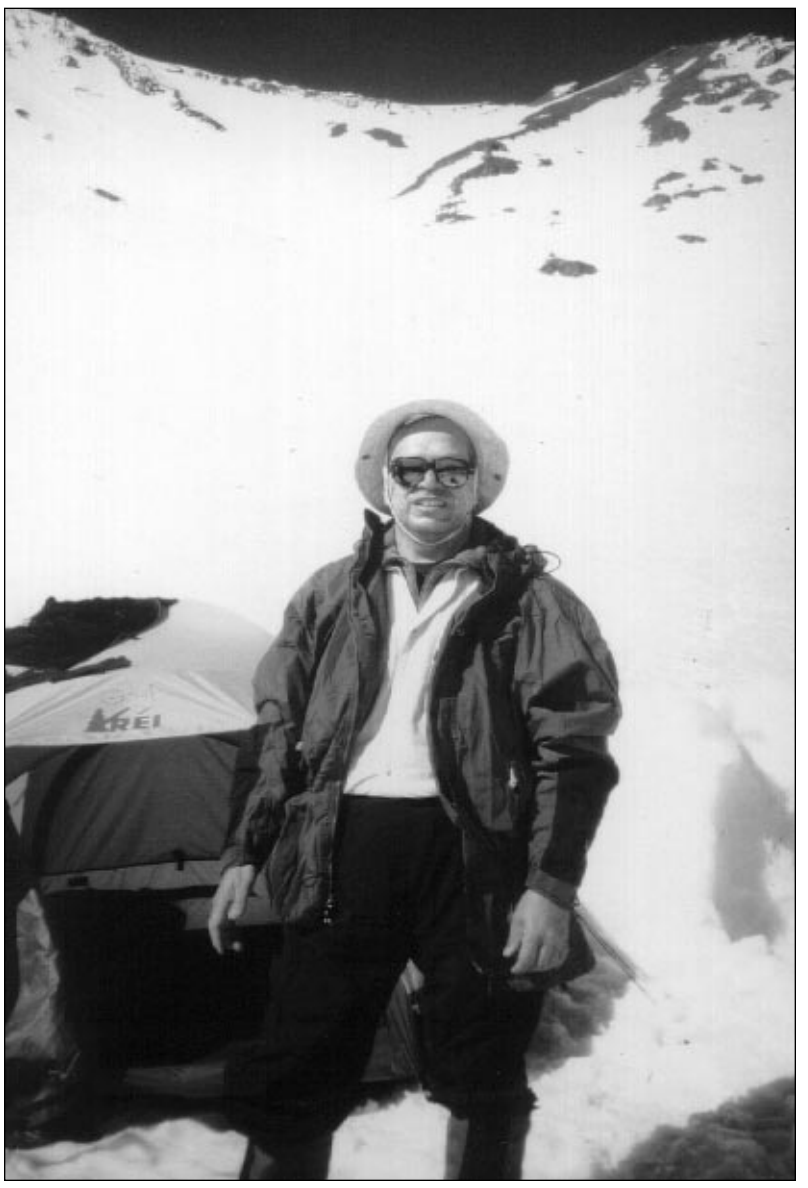
Cold Colleague

JSC space walk engineer uses Antarctic expedition to study extraterrestrial EVA



Top: Robert Trevino, staff engineer for the Advanced EVA Research and Development Group at JSC, takes a break at Base Camp 2 during his climb to the 14,161-foot summit of Mt. Shasta in California. Trevino made the climb as a training exercise to prepare himself for the rigors of his Antarctic expedition. He also climbed to the summit of the 10,457-foot Lassen Peak in Lassen Volcanic National Park, Calif. Bottom left: Trevino participates in a simulation of an STS-51I space walk that utilized a "stinger" satellite capture device. Bottom center: Trevino works on console in the Mission Control Center during the STS-51I extravehicular activity. Bottom right: Trevino stands atop the summit of Gruadalupe Peak in Guadalupe Mountain National Park, Texas, during another training exercise.

By Kelly Humphries

When Robert Trevino goes outside today, the temperature probably will be in the 30s and he'll be preparing to conduct a flight test.

But the 30s he'll be experiencing will be below zero, the flight test will be for a Dehaviland Twin Otter fitted with skis and the landscape over which he'll be flying will be Antarctic.

Trevino, a veteran flight controller and staff engineer for the Advanced EVA Research and Development Group, is participating in an exchange assignment with the National Science Foundation's Support Office for Aerogeophysical Research.

Trevino left Houston and its balmy weather for Antarctica in October as part of an NSF-sponsored expedition that is using the airborne platform and an integrated suite of instruments such as ice-penetrating radar, laser altimeters, gravimeters and a magnetometers for use in tracking the movement of the Antarctic ice shelf and investigating evidence of global warming.

Trevino's assignment will involve engineering, integration and setup of the aircraft's instrumentation suite and operating it as a member of the air crew. He'll be working with a group of 15 people from various organizations and backgrounds, all of whom have an important role to play in the expedition. "You can't just go as an observer," he said.

At first blush, this may not sound relevant to his job in the EVA Projects Office at JSC. But Trevino plans to perform space walk and other space-related studies while in the Antarctic climate.

"This field expedition will provide NASA a unique opportunity to cooperate with NSF and acquire experience beneficial during the planning stages of the Human Lunar Return and Marx Exploration Missions," wrote SOAR Director Donald Blankenship in his invitation for Trevino to join the expedition. "There are compelling similarities between human exploration of the Moon and Mars and Antarctic research. In addition to his primary mission objective with SOAR, Mr. Trevino will be studying how Antarctic operations are conducted, equipment designed and how humans interact under harsh conditions and rugged terrain."

Trevino's work in the area of advanced EVA systems involves the management of systems that support human exploration and development of space. He works with space suits, tools, equipment and cooperative EVA-robotics systems, and is involved in development of an EVA technology road map to support future lunar and Mars exploration study teams.

"My main interest is seeing first-hand how they conduct their operations, their science and their research," he said. "I'll be looking at how the experiment equipment is designed, how the team interacts and at the psychological aspects."

Antarctica's harsh, cold environment, geologic processes and isolation pose challenges similar to those posed by other worlds and could be useful in developing and testing future human planetary surface systems, Trevino said. He plans to study the design of tools, equipment and techniques—such as core drilling through the Antarctic ice—that could be related to future EVA systems.

He also plans to closely observe logistics and resupply strategies that are used during the expedition with an eye toward the efficient use and conservation of limited resources. Maintaining and operating the expedition aircraft over a period of two months while bundled up and heavily gloved against the extreme cold will provide a situation analogous to performing multiple EVAs on another world from a habitat or pressurized rover. He plans to record the times at which he performs maintenance and repair work, and the length of time it takes to perform the repairs in the harsh environment in hopes that the log will be useful in space mission planning.

"I was surprised at how much literature and research has been done on integration in the Antarctic environment," Trevino said. "The NSF's activities in Antarctica are similar to NASA's activities in space."

Because teams in Antarctica spend long periods in isolation and confined spaces at vast distances from a safe base, Trevino said, he will observe the human factors and interpersonal dynamics of the research team and make notes of his moods and feelings using a series of psychological questions provided by Dr. Joanna Woods of JSC's psychological and behavioral lab.

To prepare for the trip, the Navy Reserve captain took a mountain climbing course and scaled Mt. Shasta in California and did some additional hiking and climbing in other areas.

Trevino left Houston for Christchurch, New Zealand on Oct. 18 and was to report to the National Science Foundation Center there on Oct. 20 for processing, outfitting and testing of his clothing and equipment. His plane to McMurdo Station, Antarctica, was scheduled to arrive Oct. 23. Once on the frozen continent, he was to attend a two-day cold weather survival school before beginning a five-day inventory of the supplies and equipment that would be shipped on a separate aircraft to the Siple Dome Field Camp, which is serving as the team's operations base in Marie Byrd Land in western Antarctica.

The team took off for Siple Dome on Nov. 4, checked out its ground equipment, integrated its instrument package into the Twin Otter aircraft and conducted a test flight to check out of the instruments before flight operations began in earnest.

Daily aircraft operations over designated ice fields are scheduled to begin next week and continue until Jan. 7. After completing the data collection, the team is scheduled to close out its Siple Dome camp the week of Jan. 8, then fly back to McMurdo Station on Jan. 14. After brief stops at McMurdo and Christchurch, Trevino is scheduled to return to Houston Jan. 18.

"I'm looking forward to being in that environment and being part of a classic scientific research expedition," Trevino said. ❑